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Molecularly imprinted polymerized methylene green as a platform for electrochemical sensing of aptamer-thrombin interactions

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Abstract

The biosensors based on DNA aptamers immobilized by electrostatic adsorption onto electropolymerized Methylene Green (MG)) imprinted with DNA have been developed and examined for thrombin detection in the range from 1 nM to 1 mM using electrochemical impedance spectroscopy (EIS) and potentiometry. The participation of DNA in MG electropolymerization and imprints formation was proved by measurements of EIS and redox signals of neutral and charged indicators. Changes in the morphology of the layers were examined using atomic force microscopy (AFM). The addition of DNA at the electropolymerization stage followed by acidic treatment of the coating significantly improved the efficiency of electrostatic adsorption of the DNA aptamer and provided sensitive detection of thrombin with limit of detection 0.5 nM.

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Keywords

Aptamers, DNA, Electrochemical impedance spectroscopy, Methylene green, Molecularly imprinted polymers, Thrombin